SYNOPSIS

ON

"STUDIES ON MANAGEMENT OF SOME IMPORTANT FUNGAL DISEASES OF *LUFFA AEGYPTIACA* MILL."

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Format for submission of Ph.D. Synopsis/Work Plan for faculty of Science to be submitted In front of RRC

Abstract of proposed work plan/problem:

1. Introduction

2. Review of Literature and Development in the subject:

3. Objectives of Research/Proposed Hypothesis:

4. Methodology to be adopted:

5. Importance of study/Society application:

- International status
- National Status
- Significance of the study

6. Proposed work Plan/Formulation and Structure of Study:

- Year-wise Plan of work and targets to be achieved

7. References

Signature	**Signature**
Research Scholar	Research Supervisor/ Guide/ Co-Guide

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"Studies on Management of Some Important Fungal Diseases of *Luffa aegyptiaca* Mill."

1) INTRODUCTION:

Luffa aegyptiaca (Mill) is a unique vegetable member of the *Cucurbitaceae* family, and Sponge gourd, Dish cloth Gourd, Smooth Loofah. Native to Asia and widely cultivated in several tropical and subtropical regions worldwide for its economical ,medicinal and nutritional uses (Lawal et al 2010). India is the second largest producer of vegetables and fruits in the world, after china. As per National Horticulture Database published by National Horticulture Board, during 2021-22, India produced 107.24 million metric tonnes of fruits and 204.84 million metric tonnes of vegetable, India contributing 11% of the total production of the world, *Luff acutangula* is a large, annual climbing plant, *Luffa aegyptiaca* is a plant of multi-purpose importance whose usefulness cuts across virtually all areas of life.

It is commonly named sponge gourd, vegetable sponge, bath sponge, dish cloth gourd and loofa (Oboh et al 2009 , Demir et al, 2008) . The green young fruit (YF) is edible either as raw like cucumber or after being cooked as in squash. A myriad of metabolites are reported in its YF. i.e Phenolic acids, flavonoids, vitamins, carotenoids, saponins and triterpenes which add to its health effects (Azeez et al 2013).

The fibers can be boiled in water, which is then used as medicine. *Luffa aegyptiaca Mill* is taken by mouth for treating and preventing colds. It is also used for nasal swelling and sinus problems. Some people use it for arthritis pain, and chest pain. Women use Luffa aegyptiaca Mill to restore absent menstrual periods. Nursing mothers use it to increase milk flow. Sometimes the whole *Luffa aegyptiaca Mill* "sponge" is rubbed against the skin to remove dead skin and stimulate the skin. While externally it is used for rheumatism, backache, as well as in hemorrhoids (Partap et al 2012).

Attacked by many fungal diseases like powdery mildews, downey mildews and powdery mildew, *Alternaria* blight, Angular leaf spot, Damping off and root rots, bacterial wilt, Scab, *Anthracnose, gummy* stem blight, *Fusarium* wilt, *Phytophthora* blight, septoria leaf spot, cucumber mosaic virus.

The objective of the present study will be find out the most efficient fungicides, Phyto-extract and bio-control agent, used either alone or in combination for the management of the *Luffa aegyptiaca* Mill.

2. REVIEW OF LITERATURE:

In sponge gourd disease spread widely in rainy season. The rain splash may play an important role in the rapid spread and aerial infection of the pathogen. Plants produce many substances for self-defence against microbial infection and deterioration. These photochemical possess potential significant therapeutic applications against human pathogens such as bacteria and fungi (Perez, 2003).

` Pre and Post-harvest diseases caused by Bacteria Yeast and Fungi develops on fruit and others plant products between harvesting and consumption. Post-harvest diseases destroy 10-30% of the total yield of crops and in some perishable crops especially in developing countries; they destroy more than 30% of the crop yield (Agrios, 2005; Kader, 2002). Fungi are the most important and prevalent pathogens, infecting a wide range of host plants and causing destructive and economically important losses of most fresh fruits and vegetables during storage and transportation (Sommer, 1985). The pathogencity was proved by inoculating the injured healthy fruits with spore suspension of *Alternaria alternata* isolated from rotted fruits kinnow (*Citrus deliciosa*) (Sharma et al., 2008).

Artificially infested seeds of cucumber, bitter gourd and bottle gourd when treated with fungicides significantly increased seed germination and reduced seed infection by F. solani at all concentrations except Vitavax and Ridomil when used @1g a.i./kg seeds reduced seed germination as compared to control in cucumber and bitter gourd respectively. Maximum seed germination was recorded in cucumber by Aliette and Benlate, in bottle gourd by Benlate and Carbendazim and in bitter gourd by Benlate. Carbendazim completely eradicated seed borne infection of F. solani in bitter gourd and gave maximum reduction in cucumber and bottle gourd. It is reported that wilt of patchouli has been effectively managed by drenching the soil with 0.1% carbendazim, carbendazim + mancozeb (Chavan et al., 2009). All microbial antagonists significantly reduced seed infection caused by F. solani in bottle gourd, bitter gourd and cucumber with no significant effect on seed germination.

(Bhandari and Singh ,1976) observed that fructose and mannose supported better growth of *Alternaria triticina* compared to ribose, arabinose, xylose, sucrose, glucose,

maltose and lactose. found that growth of *Alternaria alternata* was maximum on maltose followed by sucrose, starch, glucose and maltose and poor growth was noticed on galactose and mannitol. Physiological and biochemical characteristics of the *Geotrichum candidum* strain. It was found that the strain fermented sugar such as glucose and galactose, and was resistant to cycloheximide. (Loo et al., 2006).

The application of RG-specific primers allowed us to determine that all *Stagonosporopsis cucurbitacearum* isolates from Tunisia and Italy belonged to the genetic group RGII; thus, none belonged to the genetic group RGI, which is prevalent in Florida and Georgia (Babu et al. 2015). To our knowledge, there were no specific primers already available for the molecular identification of the genera *Albifimbria, Paramyrothecium,* and *Stemphylium*. In this study, species-specific primers were thus designed to identify *Paramyrothecium roridum*, *Albifimbria verrucaria*, and *Stemphylium vesicarium*. The ITS region of nuclear rDNA is the main genomic region targeted for PCR primer development.

Hydrolytic enzymes such as cellulose and pectinase etc, In case of post-harvest pathogens have been studied by some workers. These enzymes were found to be helpful during invasion and colonization by various plants pathogens.CMC proved highly inhibitory for amylase production where as glucose and fructose stimulated the amylase activity in *Alternaria alternata, A. crassa, A. dianthicola* and *A. tenuissima.* Lipase production was found to be stimulated in the presence of disaccharides and polysaccharides in all the species of *Alternaria* (Rathod and Chavan, 2010).

Maximum reduction in seed infection by T. harzianum was recorded in cucumber by T. harzianum and T. viride in bitter gourd and by T. harzianum and G. virens in bottle gourd reported that T. harzianum and B. subtilis completely suppress the growth of F. solani and effectively minimized storage rot by dipping rhizomes of ginger in a combined suspension of Pseudomonas fluorescens and T. harzianum @ 0.5% for 30 min before storage.

Akhter et al. (2006) was tested eight ethanolic plant extracts and ten aqueous plant extracts in combination with cow urine to inhibition of conidial germination of *Bipolaris sorokiniana* causing leaf blight disease of wheat and recorded that *Adhatoda vasica* (leaf) and *Zingiber officinalis* (rhizome) extracts were most effective in inhibition of conidial germination at 2.5% concentration where, most cases *Ocimum sactum* extracts exhibited less inhibitory effect.

3) OBJECTIVES OF RESEARCH

1) Survey of the fungal diseases.

2) Isolation and Pathogenicity of the pathogens.

3) Sensitivity of the pathogens to different fungicides (MIC).

4) Physiological and Biochemical changes of the pathogens.

5) Analysis of molecular characterization of pathogens.

6) Study of enzymes and toxins of the pathogens.

7) Eco-friendly approaches for the management of the pathogens.

4) MATERIALS AND METHODS

Material and method are used in management of fungal diseases of *Luffa aegyptiaca* Mill are as follows:-

1) Field survey of the fungal diseases and Collection of infected plant parts like fruits.

Luffa aegyptiaca Mill pre and post harvest diseased fruit samples collections conduct in farmers' field and markets. The collected samples were kept separately in pre-sterilized polythene bags at 4^0 C and were used for further study.

2) Isolation and identification of different fungal pathogens and Pathogencity.

The fungus was isolated and identified by using different manuals (Ellis, 1971, Barnett, 1960, Subramanim, 1971)

The pathogenicity test revealed that threen spoilage fungi (*F. oxysporum*, *Aspergillus niger* and *Aspergillus flavus*) induce rot in yams (Okigbo and Nmeka, 2005).

3) Sensitivity of the pathogens to different fungicides (Mic).

i) *In vitro*

Sensitivity of isolates was tested against chlorothalonil, mancozeb and carbendazim etc. determined by food poisoning test (Dekkar and Gielink, 1979; Nene and Thapliyal, 2002).

ii) *In vivo*

Diameter of the infected portion was considered for calculations as percentage of control. Fruit well, treated with sterile distilled water served as control (Hiwale, 2003).

3) Physiological and Biochemical changes of the pathogens

i) Physiological changes of the pathogens (Bhale et al., 2010).

Isolates of pathogens were grown on Czapek Dox Agar (CZA) medium and radial growth was measured after 8^{th} days. The growth effects were studied by amending different sources viz, carbon, nitrogen, phosphate, sulphate sources, amino acids and vitamins on the CZA medium. Radial growths of the fungi were measured 8^{th} day after inoculation (DAI).

ii) Biochemical changes of the pathogens (Bhale et al., 2010).

This was studied by inoculating the *Luffa aegyptiaca* Mill. fruit with spore and mycelial suspension of resistant isolate and sensitive isolate with the help of cork borer (4mm), a deep well (3mm) was prepared. Seven day after inoculation fruit were dried at 40°C in hot air oven and powder was obtained in grinder. The samples were extracted in ethanol and were analysed for all the biochemical estimations.

4) Analysis of molecular characterization of pathogens. (Rashid et al. 2016).

Fungal identification will be carried out by 18s rRNA and DNA sequencing as per the procedures described by Rashid et al. (2016).

5) Study of enzymes and toxins of the pathogens. Cup plate method (Dingal et al., 1953)

i) Hydrolytic and enzymes

Detection of enzyme activities of isolated fungi from pre and post –harvested. The extracellular production of hydrolytic enzymes was important activity with respect to mycoparasitism and antibiosis of the fungal species. Commercial production of extracellular hydrolytic enzymes was employed commercially and the work about the enzyme activities is still going progressively. Hence in the present research work of detection of hydrolytic enzymes such as Cellulase, amylase, lipase and Pectinase were carried out.

ii) Phytotoxin assay (Haikal, 2008).

6) Eco-friendly approaches for the management of the pathogens. (Mishra and Tiwari, 1992).

Fungi toxicity of leaf extracts, Essential oil extract, Plant latex, *Trichoderma* Species was studied by food poisoning technique described by (Mishra and Tiwari, 1992).

5) IMPORTANCE OF STUDY:

Control of plant and fruit disease is a pressing need for agriculture in the 21st century. The increasing demand for a steady, healthy food supply by a burgeoning human population will require controlling diseases that reduce fruit. Furthermore, increased pressure for food production will intensify the demands on agricultural production systems, which in turn, may increase disease pressure on fruit. Under integrated fungal disease management programmed cost effective and eco- friendly component like plant extracts, products, Bio pesticides etc used to control plant pathogens. Experimentations over the years have established that botanicals are socially acceptable by the farmers, environment friendly and economically feasible for managing the diseases. Many cultivars have been developed for size, form, color, storability, resistance to pests and pathogens and climatic adaptations.

- The study will be helpful for the identification of different fungal diseases of *Luffa aegyptiaca Mill.*
- The study will be helpful for the isolation and activity characterization of fungal pathogens.
- Sensitivity of different pathogens to different fungicides can be studied by MIC.
- The study will helpful to know physiological and Biochemical changes to the pathogens.
- It will helpful to Analysis the molecular characterization of pathogens
- It is helpful in study of enzymes and toxins of the pathogens
- The most important objective of this research is to Eco-friendly management of fungal diseases of *Luffa aegyptiaca Mill.*

6. PROPOSED WORK PLAN:

First Year:

1. Survey of the fungal diseases.
2. Isolation, Identification and Pathogenicity of the pathogens.
3. Sensitivity of the pathogens to different fungicides (MIC).

Second year

4. Physiological and biochemical changes of the pathogens.
5. Molecular characterization of pathogens.
6. Study of enzymes and toxins of the pathogens.
7. Eco-friendly approaches for the management of the pathogens

Third year

8. Thesis writing work. Calculation, table, plotting of graphs , micrographs, writing other paper work will be done

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